Microarrays

Functional genomic data analysis: transcriptomics





Nucleic acid hybridization



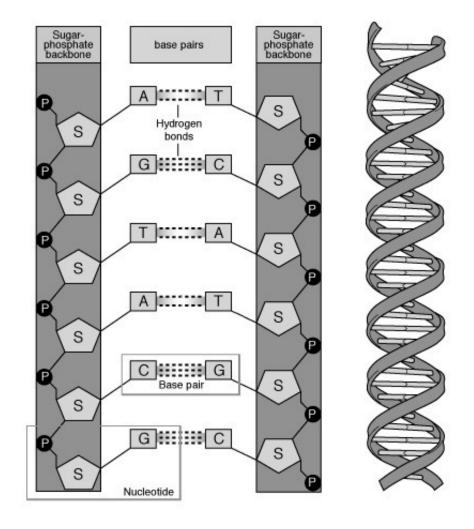


Two complementary sequences can hybridized together.

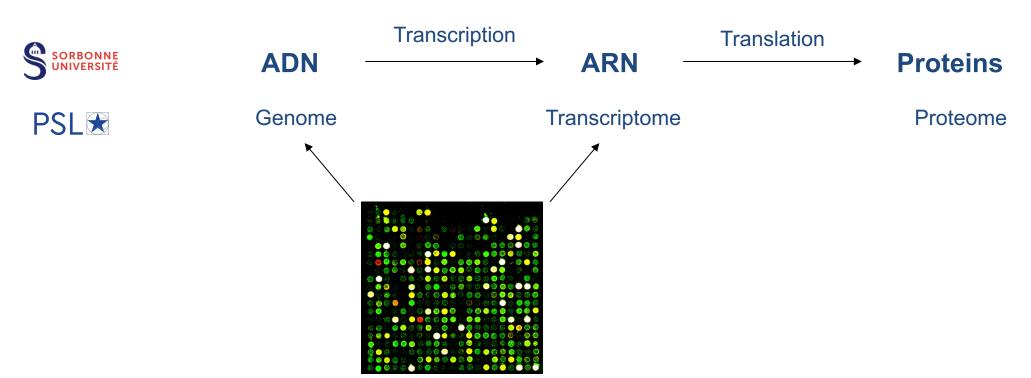
Hybridization is influences by several parameters:

- Specificity (cross-hybridization)
- Sensitivity (Tm, secondary structure, ...)
- Sequences (size, base composition)

Some parameters can be controlled by hybridization buffer stringency (temperature, salt concentration and H bond destabilizing agent like formamide).



The molecular biology central dogma

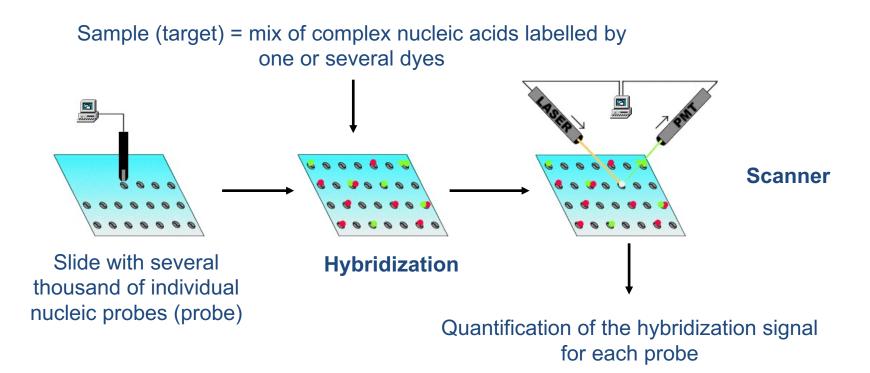


DNA microarray is a functional genomic technique that allows for the analysis of genome and transcriptome of cells

DNA microarray general principle







Microarray application examples



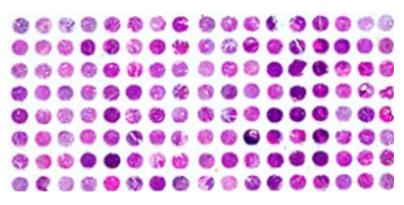


Genotyping

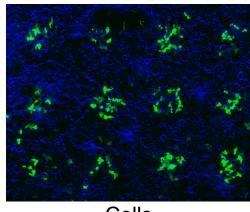
- Polymorphism detection (SNP)
- Mutation detection
- CGH array

Gene expression profiles

- Compare expression levels between various biological conditions
- Transcription and replication dynamic
- RNA stability and maturation study
- Nucleic acids and proteins interaction studies
- Diagnostic (identify pathogenic strains, ...)
- Whole genome expression profile analysis = Transcriptional fingerprint



Tissue samples



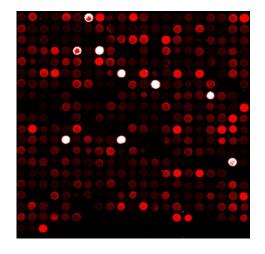
Cells

Image acquisition

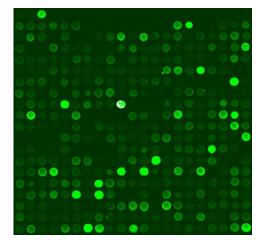




Condition 1
Cy5 wavelength



Condition 2
Cy3 wavelength



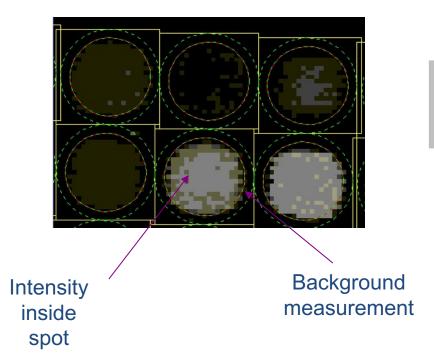
Final image



Globale intensity calculation







Net intensity

=

Raw intensity - Background

Raw result output

Example of an output file from image analysis software





Position Intensities Size Homogeneity Statistics Annotations Raw Bkg

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